Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

The two-time energy spectrum of weak magnetohydrodynamic turbulence JEAN C. PEREZ, Florida Institute of Technology — The two-time energy spectrum is a fundamental quantity in turbulence theory from which relevant statistical properties of a homogeneous turbulent system can be derived. A closely related quantity, obtained via a spatial Fourier transform, is the two-point, two-time correlation function that describes the space-time correlations arising from the underlying dynamics of the turbulent fluctuations. Both quantities are central in fundamental turbulence theories as well as in the analysis of turbulence experiments and simulations. The recent launch of the Parker Solar Probe (PSP), whose goal is to explore the near-Sun region where the solar wind is born, has renewed the interest in understanding the structure, and possible universal properties, of space-time correlations. The main hurdle affecting statistical turbulence theories is the well know closure problem, which requires ad-hoc assumptions about the high-order statistics of the space-time correlations. In this work, a wave-turbulence closure is used to obtain the structure of the two-time power spectrum of weak magnetohydrodynamic (MHD) turbulence from the nonlinear equations describing the dynamics. A wave-kinetic equation for the two-time power spectrum is derived for incompressible Alfvenic fluctuations whose nonlinear dynamics is described by the Reduced MHD equations.

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Date submitted: 02 Oct 2019 Electronic form version 1.4